



CAMP RIO CTE FIELD EXPERIENCE

ENGINEERS FOR THE OUTDOORS

DESIGN • BUILD • TEST • IMPROVE

A one-day engineering design challenge for up to 40 high school CTE students.



REAL PROBLEMS. REAL CLIENTS. REAL ENGINEERING.

Students work as engineering firms to solve authentic Camp RIO infrastructure challenges, build and test prototypes, improve designs, and present recommendations.

HANDS-ON DESIGN CHALLENGES

1 SHADE STRUCTURE

Structural loading, geometry, materials and wind resistance.

2 ACCESS FOR ALL

Universal design, accessible platforms and human-centered solutions.

3 SMART STORAGE

Space utilization, secure gear systems and operational efficiency.

4 WATER CONSERVATION

Rainwater collection, fluid systems and sustainable design.



STUDENTS WILL

- Apply the Engineering Design Process
- Build and test scaled prototypes
- Adapt to a real-world design change

CTE + IBC ALIGNMENT

- Engineering Design Process
- Engineering Science & Presentation
- Practicum / PLTW Engineering
- Engineering Technology Foundations

BRING ENGINEERING TO LIFE AT CAMP RIO

Designed for up to 40 high school CTE students • One-day field experience

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Engineers for the Outdoors

Engineering Design Challenge Camp

Design | Build | Test | Improve

High school CTE students | 40 participants | Four engineering firms of 10

PROGRAM OVERVIEW

Students work as engineering firms hired by Camp RIO to solve authentic infrastructure challenges. Teams define a problem, develop a design, build and test a prototype, revise the solution, and present recommendations.

CTE and IBC Alignment

CTE Courses and Skills	Industry-Based Certifications
Engineering Design Process Engineering Science Engineering Design and Presentation Practicum in Engineering PLTW Engineering Courses	Engineering Technology Foundations Mechanical Engineering Foundations

Sample Schedule | 9:00 AM-2:00 PM

Time	Activity
9:00-9:20	Engineering briefing, safety, and firm assignments
9:20-10:50	Activity Block 1: Camp Innovation Challenge (90 minutes)
10:50-11:20	Lunch
11:20-12:50	Activity Block 2: Build, Test & Improve (90 minutes)
12:50-1:15	Prototype reset, documentation, and presentation preparation
1:15-2:00	Client review, discussion, reflection, and career connections

Student Organization: Four Engineering Firms

Students are divided into four firms of 10. Each firm is assigned one camp challenge and uses shared engineering roles to complete the design and prototype process.

Engineering Roles	Firm Structure
Project Manager	CAD / Design Lead
Lead Engineer	Safety Lead
Civil Engineer	Testing Lead
Mechanical Engineer	Construction Lead
Environmental Engineer	Presentation Lead

Activity Block 1: Camp Innovation Challenge

Each firm investigates and designs a solution for one Camp RIO need: a shade structure, an accessible camp feature, an equipment storage system, or a sustainable water collection station.

- Define the problem, users, requirements, constraints, and success criteria.
- Develop sketches, a site plan, materials list, and budget estimate.
- Apply structural, mechanical, environmental, accessibility, and human-centered design concepts.
- Select a design and prepare a clear prototype plan.

Activity Block 2: Build, Test & Improve

Firms build and test a scaled model using available construction materials. Each firm receives a mid-exercise design revision, such as a reduced budget, unavailable material, increased capacity requirement, new client request, or environmental restriction.

- Build safely and document materials, dimensions, and design decisions.
- Test stability, load capacity, coverage, efficiency, accessibility, or usability as appropriate.
- Analyze results and identify what worked, what failed, and why.
- Revise the prototype and prepare a client recommendation.

End-of-Day Client Review and Discussion

The day concludes with a facilitated client review rather than awards. Each firm presents its problem, proposed solution, testing results, design changes, and recommendation for possible Camp RIO use.

- How well did the design meet the requirements and constraints?
- What evidence from testing supports the recommendation?
- How did the firm respond to the design revision?
- What would the firm improve with additional time or resources?

Learning Outcomes

- Apply the Engineering Design Process to an authentic problem.
- Create engineering documentation and communicate design decisions.
- Build, test, evaluate, and improve a scaled prototype.
- Practice collaboration, adaptability, safety, budgeting, and presentation skills.